

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE 1 OF 1 PAGES	
2. AMENDMENT/MODIFICATION NO. 0003		3. EFFECTIVE DATE 8 SEP 98		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
6. ISSUED BY Department of the Army Corps of Engineers Fort Worth District		CODE		7. ADMINISTERED BY (If other than Item 6)		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(✓)		9A. AMENDMENT OF SOLICITATION NO. DACA63-98-B-0055	
				X		9B. DATED (SEE ITEM 11) 17 AUG 1998	
						10A. MODIFICATION OF CONTRACTS/ORDER NO.	
						10B. DATED (SEE ITEM 13)	
CODE				FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(✓)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
The Solicitation for LAUNCH COMPLEX REVITALIZATION, WHITE SANDS MISSILE RANGE, NEW MEXICO, is amended as follows:

The following specification sections shall be voided and the accompanying new sections of the same title and number, each bearing the notation "ACCOMPANYING AMENDMENT NO. 0003 TO SOLICITATION NO. DACA63-98-B-0055" shall be substituted therefor:

SECTION 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
SECTION 13120 STANDARD METAL BUILDING SYSTEMS

NOTE: Bid Opening date remains "16 September 1998, 2 p.m., CDT, as previously announced.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)		16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	
15C. DATE SIGNED		16C. DATE SIGNED	

SECTION 07416

STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
07/97

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

AA-02 (1994) Aluminum Design Manual:
Specifications and Guidelines for Aluminum
Structures

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC-04 (1989) Specification for Structural Steel
Buildings - Allowable Stress Design,
Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI-01 (1986; Addenda 1989) Cold-Formed Steel
Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 463 (1996a) Steel Sheet, Aluminum-Coated, by
the Hot-Dip Process

ASTM A 653 (1996) Steel Sheet, Zinc-Coated
(Galvanized) or Zinc-Iron Alloy-Coated
(Galvannealed) by the Hot-Dip Process

ASTM A 792 (1995) Steel Sheet, 55% Aluminum-Zinc
Alloy-Coated by the Hot-Dip Process

ASTM B 117 (1994) Operating Salt Spray (Fog) Testing
Apparatus

ASTM B 209 (1996) Aluminum and Aluminum-Alloy Sheet
and Plate

ASTM C 518 (1991) Steady-State Heat at Flux
Measurements and Thermal Transmission
Properties by Means of the Heat Flow Meter
Apparatus

ASTM C 991 (1992) Flexible Glass Fiber Insulation for
Pre-Engineered Metal Buildings

ASTM C 1289 (1995) Faced Rigid Cellular

Polyisocyanurate Thermal Insulation Board

ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1994) Specular Gloss
ASTM D 714	(1987; R 1994) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1308	(1987; R 1993) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1993) Calculation of Color Differences from Instrumentally Measured! Color Coordinates
ASTM D 2247	(1994) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1995) Measuring Adhesion by Tape Test
ASTM D 4214	(1989) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 4587	(1991) Conducting Tests on Paint and Related Coatings and Materials Using a Fluorescent UV-Condensation Light- and Water-Exposure Apparatus
ASTM E 84	(1996a) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM E 1592	(1995) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(1995) Minimum Design Loads for Buildings and Other Structures
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METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA-01 (1996) Low Rise Building Systems Manual

STEEL JOIST INSTITUTE (SJI)

SJI-01 (1994) Standard Specifications Load Tables
and Weight Tables for Steel Joists and
Joist Girders

1.2 GENERAL REQUIREMENTS

The Contractor shall furnish a manufacturer's standard product which satisfies all requirements contained herein and has been verified by load testing and independent design analyses to meet the specified design requirements.

1.2.1 Manufacturer

The SSSMR system shall be the product of a manufacturer who has been in the practice of manufacturing SSSMR systems for a period of not less than 3 years and has been involved in at least five projects similar in size and complexity to this project.

1.2.2 Installer

The installer shall be certified by the SSSMR system manufacturer to have experience in installing at least three projects that are of comparable size, scope and complexity as this project for the particular roof system furnished. The installer may be either employed by the manufacturer or be an independent installer.

1.3 DESIGN REQUIREMENTS

The design of the SSSMR system shall be provided by the Contractor as a complete system. Members and connections not indicated on the drawings shall be designed by the Contractor. Roof panels, components, transitions, accessories, and assemblies shall be supplied by the same manufacturer.

1.3 Design Criteria

Design criteria shall be in accordance with MBMA-01 unless otherwise specified.

1.4 Dead Loads

The dead load shall be the weight of the SSSMR system. Collateral loads such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.

1.5 Live Loads

1.5.1 Concentrated Loads

The panels and anchor clips shall be capable of supporting a 300 pound concentrated load. The concentrated load shall be applied at the panel midspan and will be resisted by a single standing seam metal roof panel assumed to be acting as a beam. The undeformed shape of the panel shall be

used to determine the section properties.

1.5.2 Uniform Loads

The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.

1.6 Roof Snow Loads

The design roof snow loads shall be as shown on the contract drawings.

1.7 Wind Loads

The design wind uplift pressure for the roof system shall be as shown on the contract drawings. The design uplift force for each connection assembly shall be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly. The safety factor listed below shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when figuring fastener design loads.

a. Single fastener in each connection.....3.0

b. Two or more fasteners in each connection...2.25

1.8 Thermal Loads

Roof panels shall be free to move in response to the expansion and contraction forces resulting from a total temperature range of 122 degrees F during the life of the structure.

1.9 Framing Members Supporting the SSSMR System

Any additions/revisions to framing members supporting the SSSMR system to accommodate the manufacturer's/fabricator's design shall be the Contractor's responsibility and shall be submitted for review and approval.

New or revised framing members and their connections shall be designed in accordance with AISI-01. Maximum deflection under applied live load, snow, or wind load shall not exceed 1/180 of the span length.

1.10 Roof Panels Design

Steel panels shall be designed in accordance with AISI-01. The structural section properties used in the design of the panels shall be determined using the unloaded shape of the roof panels. The calculated panel deflection from concentrated loads shall not exceed 1/180 of the span length. The calculated panel deflection under applied live load, snow, or wind load shall not exceed 1/180 times the span length. Deflections shall be based on panels being continuous across three or more supports. Deflection shall be calculated and measured along the major ribs of the panels.

< /SPT>1.10.1 Accessories and Their Fasteners

Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. There shall be a minimum of two fasteners per clip. Single fasteners with a minimum diameter of 3/8 inch will be allowed when the supporting structural members are prepunched or predrilled.

1.11 PERFORMANCE REQUIREMENTS

The SSSMR shall be tested! for wind uplift resistance in accordance with ASTM E 1592; SSSMR systems previously tested and approved by the Corps of Engineers' STANDARD TEST METHOD FOR STRUCTURAL PERFORMANCE OF SSMRS BY UNIFORM STATIC AIR PRESSURE DIFFERENCE may be acceptable. Two tests shall be performed. Test 1 shall simulate the edge condition with one end having crosswise restraint and other end free of crosswise restraint. The maximum span length for the edge condition shall be 30 inches. Test 2 shall simulate the interior condition with both ends free of crosswise restraint.

The maximum span length for the interior condition shall be 5.0 feet. External reinforcement, such as clamps on the ribs, shall not be installed to improve uplift resistance. Bolts through seams shall not be installed.

1.12 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Analysis; GA.

Design analysis signed by a Registered Professional Engineer employed by the SSSMR manufacturer. The design analysis shall include a list of the design loads, and complete calculations for the support system (when provided by the Contractor), roofing system and its components; valley designs, gutter! r/downspout calculations, screw pullout test results, and shall indicate how expected thermal movements are accommodated.

SD-04 Drawings

Structural Standing Seam Metal Roof System; GA.

Metal roofing drawings and specifications and erection drawings; shop coating and finishing specifications; and other data as necessary to clearly describe design, materials, sizes, layouts, standing seam configuration, construction details, provisions for thermal movement, line of panel fixity, fastener sizes and spacings, sealants and erection procedures. Drawings shall reflect the intent of the architectural detailing using the manufacturer's proprietary products and fabricated items as required. The SSSMR system shop drawings shall be provided by the metal roofing manufacturer.

SD-08 Statements

Qualifications; FIO.

Qualifications of the manufacturer and ! installer.

SD-09 Reports

Test Report for Uplift Resistance of the SSSMR; GA.

The report shall include the following information:

- a. Details of the SSSMR system showing the roof panel cross-section with dimensions and thickness.
- b. Details of the anchor clip, dimensions, and thickness.
- c. Type of fasteners, size, and the number required for each connection.
- d. Purlins/subpurlins size and spacing used in the test.
- e. Description of the seaming operation including equipment used.
- f. Maximum allowable uplift pressures. These pressures are determined from the ultimate load divided by a factor of safety equal to 1.65.
- g. Any additional information required to identify the SSSMR system tested.
- h. Signature and ! seal of an independent registered engineer who witnessed the test.

SD-13 Certificates

Structural Standing Seam Metal Roof System; FIO.

- a. Certification that the actual thickness of uncoated sheets used in SSSMRS components including roofing panels, subpurlins, and concealed anchor clips complies with specified requirements.
- b. Certification that materials used in the installation are mill certified.
- c. Previous certification of SSSMR system tested under the Corps of Engineers' Standard Test Method in lieu of ASTM E 1592 testing.
- d. Certification that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than three pieces has been tested and has met the quality standards specified for factory color finish.
- e. Certification of installer.
- f. Warranty certificate. At the completion of the project the Contractor shall furnish signed copies of the 5-year Warranty for Structural Standing Seam Metal Roof (SSSMR) System, a sample copy of which is attached to this section, and the 20-year Manufacturer's Material Warranties.

Insulation; GA.

One piece, 12 by 12 inches, of each type and thickness to be used, with a label indicating the rated permeance (if faced) and R-values. The flame spread, and smoke developed rating shall be shown on the label or provided in a letter of certification.

Gaskets and Insulating Compounds; GA.

Two samples of each type to be used and descriptive data.

Sealant; GA.

One sample, approximately 1 pound, and descriptive data.</TX! T>

Concealed Anchor Clips; GA.

Two samples of each type used.

Subpurlins; GA.

One piece, 9 inches long.

EPDM Rubber Boots; GA.

One piece of each type.

1.13 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weathertight coverings and kept dry. Storage conditions shall provide good air circulation and protection from surface staining.

1.14 WARRANTIES

The SSSMR system shall be warranted as outlined below. Any emergency temporary repairs conducted by the owner shall not negate the warranties.

1.14.1 Contractor's Weathertightness Warranty

The SSSMR system shall be warranted by the Contractor on a no pen! al sum basis for a period of five years against material and workmanship deficiencies; system deterioration caused by ordinary exposure to the elements and service design loads, water leaks, and wind uplift damage. The SSSMR system covered under this warranty shall include the entire roofing system including, but not limited to, the following: panel seams and joint, all accessories, components and trim; penetrations such as vents, curbs, and skylights; interior or exterior gutters and downspouts; eaves, ridge, hip, valley, rake, gable, wall, or other roof system flashings installed to provide a weathertight roof system; and items specified in other sections of these specifications that become part of the structural standing seam metal roof system. All material and workmanship deficiencies, system deterioration caused by ordinary exposure to the elements and service design loads, water leaks and wind uplift damage shall be repaired as approved by the Contracting Officer. Th! is warranty shall warrant and cover the entire cost of repair or replacement, including all material, labor, and related markups. The Contractor may supplement this warranty with written warranties from the installer and/or manufacturer, which shall be submitted along with Contractor's warranty; however, the Contractor shall be ultimately responsible for this warranty. The Contractor's written warranty shall be as outlined in

attached example WARRANTY FOR STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM, and shall start upon final acceptance of the facility or the date the Government takes possession, whichever is earlier. It shall be understood that the Contractor's Performance Bond will remain effective throughout the five year Contractor's warranty period for the entire SSSMR system as outlined above.

1.14.2 Manufacturer's Material Warranties.

The Contractor shall furnish, in writing, the following manufacturer's material warranties ! which cover all SSSMR system components such as roof panels, anchor clips and fasteners, flashing, accessories, and trim, fabricated from coil material:

- a. A manufacturer's 20 year material warranty warranting that the aluminum, zinc-coated steel, as specified herein will not rupture, structurally fail, fracture, deteriorate, or become perforated under normal design atmospheric conditions and service design loads. Liability under this warranty shall be limited exclusively to the cost of either repairing or replacing nonconforming, ruptured, perforated, or structurally failed coil material.
- b. A manufacturer's 20 year exterior material finish warranty on the factory colored finish warranting that the finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of eight, as determined by ASTM D 4214 test procedures; or change color in excess of five CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. Liability under this warranty is exclusively limited to refinishing with an air-drying version of the specified finish or replacing the defective coated material.

PART 2 PRODUCTS

2.1 ROOF PANELS

Panels shall be steel and shall have a factory color finish. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope for slope lengths that do not exceed 30 feet. When length of run exceeds 30 feet and panel laps are provided, each sheet in the run shall extend over three or more supports. Sheets longer than 100 feet may be furnished if approved by the Contracting Officer. Width of sheets shall provide not more than 24 inches of coverage in place. SSSMR system with roofing panels greater than 12 inches in width shall have standing seams rolled during installation by an electrically driven seaming machine. Height of standing seams shall be not less than 2 inches (2-3/4-inches including seam) for rolled seam.

2.1.1 Steel Panels

Steel panels shall be zinc-coated steel conforming to ASTM A 653; aluminum-zinc alloy coated steel conforming to ASTM A 792, AZ 55 coating; or aluminum-coated steel conforming to ASTM A 463, Type

2, coating designation T2 65. Uncoated panels shall be 0.0239 inch thick minimum. Panels shall be within 95 percent of tested thickness.

2.2 CONCEALED ANCHOR CLIPS

Concealed anchor clips shall be the same as the tested roofing system. Clip bases shall have factory punched or drilled holes for attachment. Clips shall be made from multiple pieces with the allowance for the total thermal movement required to take place within the clip. Single piece clips may be acceptable when the manufacturer can substantiate that the system can accommodate the thermal cyclic movement under sustained live or snow loads.

2.3 ACCESSORIES

Flashing, trim, metal closure strips, caps and similar metal accessories shall be the manufacturer's standard products. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the panels and shall not absorb or retain water. The use of a continuous angle butted to the panel ends to form a closure will not be allowed.

2.4 FASTENERS

Fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for accessories shall be the manufacturer's standard. Exposed roof fasteners shall be sealed or have sealed washers on the exterior side of the roof to waterproof the fastener penetration. Washer material shall be compatible with the roofing; have a minimum diameter of 3/8 inch for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8 inch thick. Exposed fasteners for factory color finished panels shall be factory finished to match the color of the panels.

2.4.1 Screws

Screws for attaching anchor devices shall be not less than No. 14. Actual screw pull out test results shall be performed for the actual material gage and yield strength of the structural purlins or subpurlins to which the clip is to be anchored/attached. Other screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

2.4.2 Bolts

Bolts shall be not less than 1/4 inch diameter, shouldered or plain shank as required, with locking washers and nuts.

2.4.3 Structural Blind Fasteners

Blind screw-type expandable fasteners shall be not less than 1/4 inch diameter. Blind (pop) rivets shall be not less than 9/32 inch minimum diameter.

2.5 SUBPURLINS

Cold formed supporting structural members/subpurlins shall have a minimum thickness of 0.059 inches and a minimum tensile yield strength of 50000 psi. Hot rolled structural members shall have a minimum thickness of 0.25 inches and a minimum tensile yield strength of 36000 psi. Subpurlins shall be galvanized or given one coat of shop paint.

2.6 FACTORY COLOR FINISH

Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall match the color indicated on the drawings in Section 09915 COLOR SCHEDULE. The exterior coating shall be a nominal [AM#3]1 mil thickness consisting of a topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than [AM#3]0.3 mil thickness. The interior color finish shall consist of a nominal [AM#3]0.2 mil dry film thickness prime coat! . The exterior color finish shall meet the test requirements specified below.

2.7 SALT SPRAY TEST

A sample of the sheets shall withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B 117, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of [AM#3]8F, few No. 8 blisters, as determined by ASTM D 714; and a rating of [AM#3]6, [AM#3]1/8 inch failure at scribe, as determined by ASTM D 1654</? RID>.

2.8 FORMABILITY TEST

When subjected to testing in accordance with ASTM D 522 Method B, 1/8 inch diameter mandrel, the coating film shall show no evidence of cracking to the naked eye.

2.9 ACCELERATED WEATHERING, CHALKING RESISTANCE AND COLOR CHANGE

A sample of the sheets shall be tested in accordance with ASTM D 4587, test condition B for 4 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be

not greater than 7 units.

2.10 HUMIDITY TEST

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.11 IMPACT RESISTANCE

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 0.500 inch diameter hemispherical head indenter, equal to 1.5 times the metal thickness in mils, expressed in inch-pounds, with no loss of adhesion.

2.12 ABRASION RESISTANCE TEST

When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of [AM#3]50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.13 POLLUTION RESISTANCE

Coating shall have no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.14 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Insulation, including facings, shall have a flame spread not in excess of 75 and a smoke developed rating not in excess of 150 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if tests are conducted in the insulation manufacturer's laboratory.

2.14.1 Blanket Insulation

Blanket insulation shall conform to ASTM C 991.

2.15 INSULATION RETAINERS

Insulation retainers shall be type, size, and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

<TT! L>2.9 SEALANT

Sealants shall be elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color and shall cure to a rubberlike consistency. Sealant placed in the roof panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

2.17 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.18 VAPOR RETARDER

2.18.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.1 perm or less when tested in accordance with ASTM E 96. Facing shall be white sheet vinyl; except that unreinforced foil with a natural finish may be used in concealed locations. Facings and finishes shall be factory applied.

2.18.2 Vapor Retarders Separate from Insulation

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**NOTE: Roof deck should not be assumed to
function as a vapor retarder.**

Vapor retarder material shall be polyethylene sheeting conforming to ASTM D 4397. A single ply of 10 mil polyethylene sheet; or, at the Contractor's option, a double ply of 6 mil polyethylene sheet shall be used. A fully compatible polyethylene tape which has equal or better water vapor control characteristics than the vapor retarder material shall be provided. A cloth industrial duct tape in a utility grade shall also be provided to use as needed to protect the vapor retarder from puncturing.

2.18.3 Slip Sheet for Use With Vapor Retarder

Slip sheet for use with vapor! retarder shall be a 5 lb. per 100 square feet rosin-sized, unsaturated building paper.

2.19 EPDM RUBBER BOOTS

Flashing devices around pipe penetrations shall be flexible, one-piece devices molded from weather-resistant EPDM rubber. Rubber boot material shall be as recommended by the manufacturer. The boots shall have base rings made of aluminum or corrosion resisting steel that conform to the contours of the roof panel to form a weather-tight seal.

2.20 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

Prefabricated curbs and equipment supports shall be of structural quality, hot-dipped galvanized, factory primed and prepared for

painting with mitered and welded joints. Integral base plates and water diverter crickets shall be provided. Minimum height of curb shall be 8 inches above finish roof. Curbs shall be constructed to match roof slope and to provide a level top surface for mounting of equipment. Curb flange shall be constructed to match configuration of roof panels. Curb size shall be coordinated, prior to curb fabrication, with the mechanical equipment to be supported. Strength requirements for equipment supports shall be coordinated to include all anticipated loads.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated by means of gaskets or insulating compounds. Molded closure strips shall be installed wherever roofing sheets terminate in open-end configurations, exclusive of flashings. The closure strip installation shall be weather-tight and sealed. Screws shall be installed with a clutching screw gun, to assure screws are not stripped. Field test shall be conducted on each gun prior to starting installation and periodically thereafter to assure it is adjusted properly to install particular type and size of screw as recommended by manufacturer's literature. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, sheets with an excess of such holes or with such holes in critical locations shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Field Forming of Panels

When roofing panels are formed from factory-color-finished steel coils at the project site, the same care and quality control measures that are taken in shop forming of roofing panels shall be observed. Rollformer shall be operated by the metal roofing manufacturer's representative. In cold weather conditions, preheating of the steel coils to be field formed shall be performed as necessary just prior to the rolling operations.

3.1.2 Subpurlins

Unless otherwise shown, subpurlins shall be anchored to the purlins or other structural framing members with bolts or screws. Attachment to the substrate (when provided) or to the panels is not permitted. The subpurlin spacing shall not exceed 30 inches on centers at the corner, edge and ridge zones, and 5 foot maximum on centers for the remainder of the roof. Corner, edge, and ridge zones are as defined in ASCE 7.

3.1.3 Roof Panel Installation

Roof panels shall be installed with the standing seams in the direction of the roof slope. The side seam connections for installed panels shall be completed at the end of each day's

work. Method of applying joint sealant shall conform to the manufacturer's recommendation to achieve a complete weather-tight installation. End laps of panels shall be provided in accordance with the manufacturer's instructions. Closures, flashings, EPDM rubber boots, roof curbs, and related accessories shall be installed according to the manufacturer's drawings. Fasteners shall not puncture roofing sheets except as provided for in the manufacturer's instructions for erection and installation. Expansion joints for the standing seam roof system shall be installed at locations indicated on the contract drawings and other locations indicated on the manufacturer's drawings.

3.1.4 Concealed Anchor Clips

Concealed anchor clips shall be fastened directly to the structural framing members. Attachment to the substrate (when provided) or to the panels is not permitted. The maximum distance, parallel to the seams, between clips shall be 30 inches on center at the corner, edge, and ridge zones, and 5 feet maximum on centers for the remainder of the roof.

3.2 INSULATION INSTALLATION

Insulation shall be continuous over entire roof surface. Where expansion joints, terminations, and other connections are made, the cavity shall be filled with batt insulation with vapor retarder providing equivalent R-value and perm rating as remaining insulation. Insulation shall be installed as indicated and in accordance with manufacturer's instructions.

3.2.1 Blanket Insulation

Blanket insulation shall be installed between and parallel to the purlins with tabs of a facer lapping on the top face of the purlins. Thermal blocks shall be provided over purlins, between clips. A second layer of unfaced insulation shall be added between purlins to provide full R-value. Blanket insulation shall be supported by an integral facing or other commercially available support system.

3.3 PROTECTION OF VAPOR RETARDER FROM ROOF DECK

A cloth industrial duct tape shall be applied over the seams of metal roof decks, at penetration edges, and at surface areas exhibiting sharp burrs or similar protrusions. For other types of roof decks, cloth industrial duct tape shall be applied over irregularities which could potentially puncture polyethylene membrane.

3.4 VAPOR RETARDER INSTALLATION

3.4.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and sealed with a compatible tape to provide a vapor tight membrane.

3.5 SLIP SHEET INSTALLATION

A slip sheet shall be laid over the blanket insulation facing to prevent the vinyl facing from adhering to the metal roofing.

3.6 CLEANING AND TOUCH-UP

Exposed SSSMR systems shall be cleaned at completion of installation. Debris that could cause discoloration and harm to the panels, flashings, closures and other accessories shall be removed. Grease and oil films, excess sealants, and handling marks shall be removed and the work shall be scrubbed clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, and solder or weld marks. Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Factory color finished surfaces shall be touched up with the manufacturer's recommended touch up paint.

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

PROJECT DESCRIPTION AND LOCATION (Include Bldg.
No.): _____

CORPS OF ENGINEERS CONTRACT

NUMBER: _____

SPECIFICATION SECTION NUMBER & DESCRIPTION:

07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM

_____!

CONTRACTOR: _____

ADDRESS: _____

POINT OF

CONTACT: _____

TELEPHONE

NUMBER: _____

OWNER: _____

ADDRESS: _____

POINT OF

CONTACT: _____

TELEPHONE

NUMBER: _____

CONSTRUCTION

AGENT: _____

ADDRESS: _____

POINT OF

CONTACT: _____

TELEPHONE

NUMBER: _____!

—

THE SSSMR SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS
WARRANTED BY _____

_____ FOR A PERIOD OF FIVE (5) YEARS AGAINST
WORKMANSHIP AND MATERIAL

DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE AND LEAKAGE. THE
SSSMR SYSTEM

COVERED UNDER THIS WARRANTY SHALL INCLUDE THE ENTIRE ROOFING
SYSTEM, INCLUDING

THE STANDING SEAM METAL ROOF PANELS, PANEL FINISHES, ROOFING
SECUREMENT

COMPONENTS, ALL ACCESSORIES, COMPONENTS, AND TRIM; INCLUDING
PENETRATIONS SUCH

VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND
DOWNSPOUTS; EAVES,

RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM
FLASHINGS INSTALLED

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN
OTHER SECTIONS OF
THE SPECIFICATIONS THAT ARE PART OF THE SSSMR SYSTEM. ALL LEAKS
SHALL BE
REPAIRED AS APPROVED BY THE CONTRACTING OFFICER. THIS WARRANTY
SHALL COVER THE
ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL,
LABOR, AND RELATED
MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF
FINAL
ACCEPTANCE ON _____ AND WILL REMAIN IN EFFECT
FOR STATED
DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

(Company President)

(Date)

(SEE REVERSE SIDE FOR SUPPLEMENTAL PROVISIONS AND EXCLUSIONS)

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

THE CONTRACTOR MAY SUPPLEMENT THIS WARRANTY WITH WRITTEN
WARRANTIES FROM

THE INSTALLER AND/OR MANUFACTURER OF THE SSSMR SYSTEM, WHICH
SHALL BE

SUBMITTED ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE
CONTRACTOR

WILL BE ULTIMATELY RESPONSIBLE FOR THE WARRANTY AS OUTLINED IN
THE

SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS,
SUSTAINED WIND
FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).

2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER
PERSONNEL,
INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE
CAUSED BY
FALLING OBJECTS.

3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT,
DISTORTION, WARPAGE, OR
DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE
BUILDING.

4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR
FUMES GENERATED
OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS,
FOUNDRIES,
PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE
LIKE.

5. FAILURE OF ANY PART OF THE SSSMR SYSTEM DUE TO ACTIONS BY THE
OWNER TO
INHIBIT FREE DRAINAGE FROM THE ROOF AND ALLOW PONDING WATER.
CONTRACTOR'S
DESIGN SHALL INSURE FREE DRAINAGE FROM THE ROOF AND NOT ALLOW
PONDING WATER.

6. THIS WARRANTY APPLIES TO THE STRUCTURAL STANDING SEAM METAL
ROOF (SSSMR)
SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE
BUILDING INTERIOR
OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION
CLAUSE INCLUDED
IN THIS CONTRACT.

7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT
WRITTEN
CONSENT OF THE CONTRACTOR AND THIS WARRANTY AND THE CONTRACT
PROVISIONS WILL

CONTRACTOR'S FIVE (5) YEAR NO PENAL SUM WARRANTY
FOR
STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM
(continued)

TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES, UNLESS
OTHERWISE

APPROVED IN WRITING BY THE CONTRACTING OFFICER.

LEAKS SHALL BE RESPONDED TO WITHIN 48 HOURS OF RECEIPT OF NOTICE
BY TELEPHONE OR

IN WRITING FROM EITHER THE OWNER, OR CONTRACTING OFFICER.

EMERGENCY REPAIRS, TO

PREVENT FURTHER ROOF LEAKS, SHALL BE INITIATED IMMEDIATELY; A

WRITTEN PLAN SHALL

BE SUBMITTED FOR APPROVAL TO REPAIR OR REPLACE THIS SSSMR SYSTEM
WITHIN SEVEN

CALENDAR DAYS. ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT
SHALL BE

STARTED WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED
WITHIN A

REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY
RESPOND TO THE

WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED
HEREIN, THE

CONTRACTING OFFICER MAY HAVE THE SSSMR SYSTEM REPAIRED OR REPLACED
BY OTHERS AND

CHARGE THE COST TO THE CONTRACTOR.

A FRAMED COPY OF THIS WARRANTY SHALL BE POSTED IN THE MECHANICAL
ROOM OR OTHER

APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

SECTION 13120

STANDARD METAL BUILDING SYSTEMS

10/91

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ALUMINUM ASSOCIATION (AA)

- | | |
|-----------|---|
| AA-01 | (1993) Aluminum Standards and Data |
| AA SAS-30 | (1986) Aluminum Construction Manual Series
- Section 1 Specifications for Aluminum
Structures |

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

- | | |
|----------|--|
| AAMA 101 | (1993) Voluntary Specifications for
Aluminum and Poly (Vinyl Chloride) (PVC)
Prime Windows and Sliding Glass Doors |
|----------|--|

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

- | | |
|-------------|---|
| AISC FCD-90 | (1990) AISC Quality Certification
Program Description |
| AISC-S303 | (1992) Code of Standard Practice for Steel
Buildings and Bridges |
| AISC-S329 | (1986) Allowable Stress Design
Specification for Structural Joints Using
ASTM A 325 or ASTM A 490 Bolts |
| AISC-S335 | (1989) Specification for Structural Steel
Buildings - Allowable Stress Design and
Plastic Design |

AMERICAN IRON AND STEEL INSTITUTE (AISI)

- | | |
|-------------|--|
| AISI SG-673 | (1987) Cold-Formed Steel Design Manual |
|-------------|--|

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|------------|---|
| ASTM A 36 | (1994a) Carbon Structural Steel |
| ASTM A 53 | (1993a) Pipe, Steel, Black and Hot-Dipped,
Zinc-Coated Welded and Seamless |
| ASTM A 252 | (1993) Welded and Seamless Steel Pipe Piles |
| ASTM A 325 | (1994) Structural Bolts, Steel, Heat |

	Treated, 120/105 ksi Minimum Tensile Strength
<R! ID>ASTM A 446	(1993) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 463	(1994) Steel Sheet, Aluminum-Coated by the Hot-Dip Process
ASTM A 490	(1993) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	(1993) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1993) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 529	(1994) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 570	(1992; R 1993) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 572	(1994b) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 588	(1994) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 606	(1991a; R 1993) Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A 607	(1992a) Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or Both, Hot-Rolled and Cold-Rolled
ASTM A 618	(1993) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 792	(1993a) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process, General Requirements
ASTM B 117	(1994) Operating Salt Spray (Fog) Testing
ASTM B 209	(1993) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1993) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

ASTM B 241	(1995) Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM B 308</R! ID>	(1995) Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM B 429	(1992a) Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM C 518	(1991) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 553	(1992) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 612	(1993) Mineral Fiber Block and Board Thermal Insulation
ASTM C 1289	(1995) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 522	(1993a) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1993) Specular Gloss
ASTM D 714	(1987; R 1994) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
A! STM D 1308	(1987; R 1993) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1993) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1994) Testing Water Resistance of Coatings in 100 % Relative Humidity
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1995) Measuring Adhesion by Tape Test
ASTM D 3841	(1992) Glass-Fiber-Reinforced Polyester Plastic Panels
ASTM D 4214	(1989) Evaluating the Degree of Chalking of Exterior Paint Films

ASTM D 4397 (1991) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

ASTM E 84 (1994a)! Surface Burning Characteristics of Building Materials

ASTM E 96 (1994) Water Vapor Transmission of Materials

ASTM E 1042 (1992) Acoustically Absorptive Materials Applied by Trowel or Spray

ASTM G 23 (1995) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (1994) Structural Welding Code - Steel

MATERIAL HANDLING INSTITUTE (MHI)

MHI CMAA 70 (1994) Electric Overhead Traveling Cranes

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA-01 (1986; Errata; Supple 1990) Low Rise Building Systems Manual

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA-1013 (1993) Architectural Sheet ! Metal Manual

STEEL DOOR INSTITUTE (SDOI)

SDOI SDI-100 (1991) Standard Steel Doors and Frames

STEEL WINDOW INSTITUTE (SWI)

SWI-01 (1989) The Specifier's Guide to Steel Windows

UNDERWRITERS LABORATORIES (UL)

UL 580 (1994; Rev thru Apr 1995) Tests for Uplift Resistance of Roof Assemblies

1.2 GENERAL

1.2.1 Building Configuration

Buildings shall have vertical walls and gable roofs. Roof slope shall be as indicated. Buildings shall be single-span and multiple-span structures with one of the following framing systems: column with rigid frame, or rigid frame (tapered beam or plate girder). All buildings to be provided with straight columns. Tapered columns will not be allowed for the

project. Interior columns to be pipe columns or tubes. Building dimensions shall be as standard with the manufacturer and not less than those indicated, but exceeding the indicated dimensions only by ! the amount of the closest standard size thereto. Eave height shall be measured from the top of the finished floor to the intersection of the insides of the roof and sidewall sheets. The clear opening between the finished floor and the bottom of the roof steel shall be as indicated.

1.2.2 Manufacturer

Metal building shall be the product of a recognized metal building systems manufacturer who has been in the practice of manufacturing metal buildings for a period of no less than 5 years. The manufacturer shall be chiefly engaged in the practice of designing and fabricating metal building systems. The manufacturer shall have an AISC Quality Certification, category MB in accordance with AISC FCD-90.

1.2.3 Installer

Erector shall have specialized experience in the erection of metal building systems for a period of at least 3 years.

1.3 DESIGN REQUIREMENTS

<NT! E>

**NOTE: Design requirements will be added or revised as
necessary to cover all pertinent considerations.**

1.3.1 Design Conditions

Loading combinations and definitions shall be in accordance with MBMA-01. Loading criteria as set out by MBMA-01 shall apply.

1.3.1.1 Dead Load

The dead load shall consist of the weight of the structural frame and all other materials of the building system.

1.3.1.2 Collateral Loads

Collateral load of 10 pounds per square foot shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings. This allowance does not include the weight of hung equipment weighing 50 pounds or more. Equipment loads of 50 pounds or more shall be investigated and the structure (frame, purlins, girts) shall be strengthened as required. The Contractor is responsible for providing the building manufacturer the magnitude and approximate location of all concentrated loads greater than 50 pounds.

1.3.1.3 Roof Live Loads

Roof live loads shall be determined and applied in accordance with MBMA-01.

1.3.1.4 Roof Snow Loads

The design ground roof snow loads shall be as shown on the contract drawings.

1.3.1.5 Wind Loads

Wind pressures shall be computed and applied in accordance with ASCE-7-95 unless otherwise shown or directed by the Contracting Officer.

1.3.1.6 Auxiliary Loads

Auxiliary (dynamic live) loads such as superimposed loads resulting from building machinery, craneways, and vehicles shall be as shown in the drawings. The Contractor shall verify that the auxiliary loads shown on the drawings exceed the loads imposed by the equipment supplied.

1.3.1.7 Concentrated Loads

Concentrated loads shall be applied at locations indicated on the drawings.

1.3.1.8 Seismic Loads

Seismic loads shall be computed for seismic zone 1 in accordance with MBMA-01 using an importance factor of 1.0.

1.3.2 Framing and Structural Members

Structural steel members and their connections shall be designed in accordance with AISC-S335. Structural cold-formed steel framing members and their connections shall be designed in accordance with AISI SG-673. Aluminum structural members and their connections shall be designed in accordance with AA SAS-30. Framed openings shall be designed to structurally replace the covering and framing displaced. The allowable live load deflection of roof elements shall not exceed 1/180th of the span.

Members with openings in their webs shall be designed with consideration of the additional stresses which will result due to the openings. Deflections of the steel framing above and along the side of rolling door openings shall be limited to a maximum of 1/2 of the allowable movement in the telescoping top roller of the doors to ensure proper operation of the doors.

1.3.3 Exterior Covering

Except as otherwise specified, steel covering shall be designed in accordance with AISI SG-673. Aluminum covering shall be designed in accordance with the AA-01. Section modulus and moment of inertia of aluminum sheet shall be determined for actual cross section dimensions by the conventional methods for actual design stresses and by effective width concept for deflection in accordance with AA SAS-30. Maximum deflection for wall and roof panels under full dead and live and/or wind loads shall not exceed 1/180th of the span between supports. The design analysis shall establish that the roof when deflected under dead plus live or snow loads, will not result in a negative gradient. Maximum deflections shall be based on sheets continuous across two or more supports with sheets unfastened and fully free to deflect. In addition to the loads indicated above, the roof decking shall be designed for a 200 pound concentrated load at midspan on a 12 inch wide section of deck. Panels thinner than 0.03 inches are not permitted for diaphragms used to resist seismic loads in Seismic Zones 2 through 4 or to resist crane loads. The methods for resisting lateral loads shall be cross-bracing, rigid frames, or wind columns.

1.3.4 Gutters And Downspouts

Gutters and downspouts shall be designed according to the requirements of SMACNA-1013 for storms which should be exceeded only once in 5 years and with adequate provisions for thermal expansion and contraction. Supports for gutters and downspouts shall be designed for the anticipated loads.

1.3.5 Drift Provision

Lateral deflections, or drift at the roof level of a structure in relation to the floor or slab on grade, caused by deflection of horizontal force resisting elements shall be limited to eave height divided by 125.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Analysis; GA.

Design analysis as one package with the detail drawings. The design analysis signed by a Registered Professional Engineer shall include a list of the design loads, and complete calculations for the building, and its components. Formulas and references shall be identified. Assumptions and conclusions shall be explained, and cross-referencing shall be clear. The design analysis shall include, but not be limited to, the following wind and seismic information:

- a. Wind forces on various parts of the structure. Both positive and negative pressures shall be calculated with the controlling pressure summarized.
- b. Lateral forces due to seismic loading.

Computer programmed designs shall be accompanied by stress values and a letter of certification, signed by a Registered Professional Engineer, stating the design criteria and procedures used and attesting to the adequacy and accuracy of the design. A narrative of the computer program delineating the basic methodology shall be included in the submittal. The program output shall be annotated and supplemented with sketches to make it easier for an engineer unfamiliar with the program to verify the input and output. Critical load conditions used in the final sizing of the members shall be emphasized. The design analysis shall include the name and office phone number of the designer and checker who function as a point of contact to answer questions during the detail-drawing review.

SD-04 Drawings

Metal Building Systems; GA.

Detail drawings consisting of catalog cuts, design and erection drawings containing an isometric view of the roof showing the design wind uplift pressure and dimensions of edge and corner zones; shop painting and finishing specifications, instruction manuals, manufacturer's recommended erection methods and procedures and other data as necessary to clearly

describe design, material, sizes, layouts, construction details, fasteners, and erection. Manufacturer's recommended erection methods and procedures shall describe the basic sequence of assembly, temporary bracing, shoring, and related information necessary for erection of the metal building including its structural framework and components. A brief list of locations where buildings of similar design have been used shall be included with the detail drawings and shall include information regarding date of installation, name and address of owner, and how the structure is used.

SD-08 Statements

Qualifications; FIO.

Qualifications of the manufacturer! , and qualifications and experience of the building erector.

SD-13 Certificates

Metal Building Systems; GA.

A Certificate from the metal building manufacturer stating that the metal building was designed from a complete set of the contract drawings and specifications and that the building furnished complies with the specified requirements.

Mill certification for structural bolts, framing steel, wall and roof covering.

Insulation; GA.

Certificate attesting that the polyurethane or polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

Precast Concrete Items; FIO.

Certificate of compliance stating that the materials meet the specified requirements.

SD-14 Samples

Accessories; <! SUB>GA.

One sample of each type of flashing, trim, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Roof and Wall Covering; GA.

One piece of each type and finish (exterior and interior) to be used, 9 inches long, full width. The sample for factory color finished covering shall be accompanied by certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that a representative sample consisting of not less than 5 pieces has been tested and has met the quality standards specified for factory color finish.

Fasteners; GA.

Two samples of each type to be used, with statement regarding intended use.

If so requested, random samples of bolts, nuts, and washers as delivered to the jobsite shall be taken in the presence of the Contracting Officer and provided to the Contracting Officer for testing to establish compliance with specified requirements.

Insulation; GA.

One piece of each type to be used, and descriptive data covering installation.

Gaskets and Insulating Compounds; GA.

Two samples of each type to be used and descriptive data.

Sealant; GA.

One sample, approximately 1 pound, and descriptive data.

1.5 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials other than framing and structural members shall be covered with weathertight coverings and kept dry. Storage accommodations for roof and wall covering shall provide good air circulation and protection from surface staining.

1.6 GUARANTEE

The metal building system shall be guaranteed against water leaks arising out of or caused by ordinary wear and tear by the elements for a period of 20 years. Such guarantee shall start upon final acceptance of the work or the date the Government takes possession, whichever is earlier.

PART 2 PRODUCTS

2.1 BUILDING COMPONENTS

Each piece or part of the assembly shall be clearly and legibly marked to correspond with the detail drawings.

2.2 FRAMING AND STRUCTURAL MEMBERS

Steel 1/8-inch or more in thickness shall conform to ASTM A 36, ASTM A 529, ASTM A 572, or ASTM A 588. Uncoated steel less than 1/8-inch in thickness shall conform to ASTM A 570, ASTM A 606, or ASTM A 607. Galvanized steel shall conform to ASTM A 446, G 90 coating designation, 0.045 inch minimum thickness. Structural pipe or tube shall conform to ASTM A 53, ASTM A 252, ASTM A 500, or ASTM A 501. Holes for bolts shall be made in the shop.

2.3 ROOF AND WALL COVERING

Panels shall be steel shall have a factory color finish. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope or the entire height of any unbroken wall surface. Width of sheets, and those with interlocking ribs shall provide not less than 12 inches of coverage in place. Design provisions shall be made for thermal expansion and contraction consistent with the type of system to be used. All sheets

shall be square cut, except gable end wall sheets may be cut in the shop to correspond to the roof slope and may have a horizontal joint at the eave line.

2.3.1 Roof Panels

Roof Panels are specified in Section 07416 STRUCTURAL STANDING SEAM METAL ROOF (SSSMR) SYSTEM. Roof deck assemblies shall be Class 90 as defined in UL 580. The ridge cap shall not have exposed fasteners. Height of corrugation at overlap of adjacent roof sheets shall be the building manufacturer's standard for the indicated roof slope.

2.3.2 Wall Panels

Wall panels shall have configurations for overlapping adjacent sheets. Wall covering shall be fastened to framework using exposed fasteners.

2.3.3 Steel Covering

Zinc-coated steel conforming to ASTM A 446, G 90 coating designation; aluminum-zinc alloy coated steel conforming to ASTM A 792, AZ 55 coating; or aluminum-coated steel conforming to ASTM A 463, Type 2, coating designation T2 65. Panels shall be 0.024 inch thick minimum, except that when the mid field of the roof is subject to design wind uplift pressures of 60 psf or greater or the steel covering is used as a diaphragm the entire roof system shall have a minimum thickness of 0.030 inch.

2.3.4 Factory Color Finish

Wall and roof panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on fluoropolymer enamel topcoat with an appropriate prime coat. Color shall match the color indicated on the drawings. The exterior coating shall be a nominal [AM#3]1 mil thickness consisting of a polyvinylidene fluoride topcoat of not less than 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than [AM#3]0.3 mil thickness. The interior color finish shall consist of a nominal [AM#3]0.2 mil dry film thickness prime coat. The exterior color finish shall meet the test requirements specified below.

2.3.4.1 Salt Spray Test

A sample of the sheets shall withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B 117, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 8F, few No. 8 blisters, as determined by ASTM D 714; and a rating of 6, 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.3.4.2 Formability Test

When subjected to testing in accordance with ASTM D 522, the coating film shall show no evidence of fracturing to the naked eye.

2.3.4.3 Accelerated Weathering, Chalking Resistance and Color Change

A sample of the sheets shall be tested a minimum of 1000 hours in accordance with ASTM G 23, using a Type EH apparatus with cycles of 60 minutes radiation and 60 minutes condensing humidity. The coating shall

withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with tape in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.3.4.4 Humidity Test

When subjected to a humidity cabinet in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.3.4.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 equal to 1.5 times metal thickness in mils, expressed in inch pounds, with no loss of adhesions.

2.3.4.6 Abrasion Resistant Test

When subjected to the falling sand test in accordance with ASTM D 968, the coating system shall withstand a minimum of 80 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel base metal.

2.3.4.7 [AM#3]_____

2.3.4.8 Pollution Resistance

Coating shall show no visual effects when immersion tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.3.5 Accessories

Flashing, trim, metal closure strips and curbs, fascia, caps, diverters, and similar metal accessories shall be not less than the minimum thickness specified for covering. Accessories shall be compatible with the system furnished. Exposed metal accessories shall be finished to match the covering building finish. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the covering and shall not absorb or retain water.

2.4 FASTENERS

Fasteners for steel wall and roof panels shall be zinc-coated steel, corrosion resisting steel, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Fasteners for structural connections shall provide both tensile and shear strength of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard. Washer material shall be compatible with the covering; have a minimum diameter of 3/8-inch for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other

equally durable elastomeric material approximately 1/8-inch thick. When wall covering is factory color finished, exposed wall fasteners shall be color finished or provided with plastic color caps to match the covering. Nonpenetrating fastener system using concealed clips shall be manufacturer's standard for the system provided.

2.4.1 Screws

Screws shall be as recommended by the manufacturer to meet the strength design requirements of the panels.

2.4.2 End-Welded Studs

Automatic end-welded studs shall be shouldered type with a shank diameter of not less than 3/16-inch and cap or nut for holding covering against the shoulder.

2.4.3 Explosive Actuated Fasteners

Fasteners for use with explosive actuated tools shall have a shank diameter of not less than 0.145 inch with a shank length of not less than 1/2-inch for fastening panels to steel and not less than 1 inch for fastening panels to concrete.

2.4.4 Blind Rivets

Blind rivets shall be aluminum with 3/16-inch nominal diameter shank or stainless steel with 1/8-inch nominal diameter shank. Rivets shall be threaded stem type if used for other than the fastening of trim. Rivets with hollow stems shall have closed ends.

2.4.5 Bolts

Bolts shall be not less than 1/4-inch diameter, shouldered or plain shank as required, with proper nuts.

2.5 GUTTERS AND DOWNSPOUTS

Gutters and downspouts shall be fabricated of zinc-coated steel or aluminum-zinc alloy coated steel and shall have manufacturer's standard factory color finish. Minimum uncoated thickness of materials shall be 0.018 inch for steel. All accessories necessary for the complete installation of the gutters and downspouts shall be furnished. Accessories shall include gutter straps, downspout elbows, downspout straps and fasteners fabricated from metal compatible with the gutters and downspouts.

! 2.6 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown on the contract drawings. R-values shall be determined at a mean temperature of 75 degrees F in accordance with ASTM C 518. Insulation shall be a standard product with the insulation manufacturer, factory marked or identified with insulation manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Blanket insulation shall have a facing as specified in paragraph VAPOR RETARDER. Insulation, including facings, shall have a flame spread not in excess of 25 and a smoke developed rating not in excess of 50 when tested in accordance with ASTM E 84. The stated R-value of the insulation shall be certified by an independent Registered Professional Engineer if

tests are conducted in the insulation manufacturer's laboratory.

2.6.1 Mineral Fiber

Insulation shall conform to ASTM C 612.

2.13.2 Blanket Insulation<! /TTL>

Blanket insulation shall conform to ASTM C 553.

2.6.3 Insulation Retainers

Retainers shall be type, size and design necessary to adequately hold the insulation and to provide a neat appearance. Metallic retaining members shall be nonferrous or have a nonferrous coating. Nonmetallic retaining members, including adhesives used in conjunction with mechanical retainers or at insulation seams, shall have a fire resistance classification not less than that permitted for the insulation.

2.7 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be colored to match the applicable building color and shall cure to a rubberlike consistency. Concealed sealant may be the nonhardening type.

2.8 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.9 VAPOR RETARDER

2.9.1 Vapor Retarders as Integral Facing

Insulation facing shall have a permeability of 0.02 perm or less when tested in accordance with ASTM E 96. Facing shall be white of reinforced foil with a vinyl finish; except that unreinforced foil with a natural finish may be used in concealed locations. Facings and finishes shall be factory applied.

2.9.2 Slip Sheet for Use With Vapor Retarder

Slip sheet for use with vapor retarder shall be a 5 per 100 square foot rosin-sized, unsaturated building paper.

2.10 PRECAST CONCRETE ITEMS

Splashblocks shall be factory-made units from a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, concrete shall be 4,000 psi minimum conforming to Section 03300 CAST-IN-PLACE STRUCTURAL CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and minimum reinforcement shall be the reinforcement required for handling of the units. Clearance of 3/4 inch shall be maintained between reinforcement and faces of units. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 pounds per square inch for at least 5 hours, the items, after casting, shall be either damp-cured for 24 hours or steam-cured and shall then be a!

ged under cover for 28 days or longer. Cast-concrete members weighing over 80 pounds shall have built-in loops of galvanized wire or other approved provisions for lifting and anchoring. Exposed-to-view surfaces shall be free of surface voids, spalls, cracks, and chipped or broken edges. Precast units exposed-to-view shall be of uniform appearance and color. Unless otherwise specified, units shall have a smooth dense finish. Prior to use, each item shall be wetted and inspected for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected. Splash blocks shall be as detailed. Reinforcement shall be the manufacturer's standard.

2.11 SHOP PRIMING

Ferrous surfaces shall be cleaned of oil, grease, loose rust, loose mill scale, and other foreign substances and shop primed. Primer coating shall be in accordance with the manufacturer's standard system.

PART 3 EXECUTION

3.1 ERECTION

3.1.1 General

Erection shall be in accordance with the approved erection instructions and drawings and with applicable provision of AISC-S335. The completed buildings shall be free of excessive noise from wind-induced vibrations under the ordinary weather conditions to be encountered at the location where the building is erected, and meet all specified design requirements. Dissimilar materials which are not compatible when contacting each other shall be insulated from each other by means of gaskets or insulating compounds. Framing members fabricated or modified on site shall be saw or abrasive cut; bolt holes shall be drilled. On-site flame cutting of framing members, with the exception of small access holes in structural beam or column webs, shall not be permitted. Improper or mislocated drill holes shall be plugged with an oversize screw fastener and gasketed washer; however, sheets with an excess of such holes or with such holes in critical locations shall not be used. Improper or mislocated bolt holes in structural members or other misfits caused by improper fabrication or erection, shall be repaired in accordance with AISC-S303. Exposed surfaces shall be kept clean and free from sealant, metal cuttings, excess material from thermal cutting, and other foreign materials. Exposed surfaces which have been thermally cut shall be finished smooth within a tolerance of 1/8-inch. Stained, discolored or damaged sheets shall be removed from the site. Welding of steel shall conform to AWS D1.1. High-strength bolting shall conform to AISC-S329 using ASTM A 325 or ASTM A 490 bolts. Concrete work is specified in Section 03300 CONCRETE FOR BUILDING CONSTRUCTION.

3.1.2 Framing and Structural Members

Anchor bolts shall be accurately set by template while the concrete is in a plastic state. Uniform bearing under base plates and sill members shall be provided using a nonshrinking grout when necessary. Members shall be accurately spaced to assure proper fitting of covering. Separate leveling plates under column base plates shall not be used. As erection progresses, the work shall be securely fastened to resist the dead load and wind and erection stresses. Supports for electric overhead traveling cranes shall be positioned and aligned in accordance with MHI CMAA 70.

3.1.3 Wall Covering and Roof Covering

Wall covering shall be applied with the longitudinal configurations in the vertical position. Roof covering shall be applied with the longitudinal configurations in the direction of the roof slope. Accessories shall be fastened into framing members, except as otherwise approved. Closure strips shall be provided as indicated and where necessary to provide weathertight construction.

3.1.3.1 Lap Type Panels with Exposed Fasteners

Except for self-framing buildings, end laps shall be made over framing members with fasteners into framing members approximately 2 inches from the end of the overlapping sheet. Side laps shall be laid away from the prevailing winds. Side lap distances, end lap distances, joint sealing, and spacing and fastening of fasteners shall be in accordance with the manufacturer's standard practice insofar as the maximum spacings specified are not exceeded and provided such standard practice will result in a structure which will be free from water leaks and meet design requirements.

Spacing of fasteners shall present an orderly appearance and shall not exceed: 8 inches on center at end laps of covering, 12 inches on center at connection of covering to intermediate supports, 12 inches on center at side laps of roof coverings, and 18 inches on center at side laps of wall coverings except when otherwise approved. Side laps and end laps of roof and wall covering and joints at accessories shall be sealed. Fasteners shall be installed in straight lines within a tolerance of 1/2-inch in the length of a bay. Fasteners shall be driven normal to the surface and to a uniform depth to properly seat the gasketed washers.

3.1.4 Gutters and Downspouts

Gutters and downspouts shall be rigidly attached to the building. Spacing of cleats for gutters shall be 16 inches maximum. Spacing of brackets and spacers for gutters shall be 36 inches maximum. Supports for downspouts shall be spaced according to manufacturer's recommendations.

3.1.5 Insulation Installation

Insulation shall be installed as indicated and in accordance with manufacturer's instructions.

3.1.5.1 Blanket Insulation

Blanket insulation shall be installed over the purlins and held tight against the metal roofing. It shall be supported by an integral facing or other commercially available support system.

3.1.6 Protection of Vapor Retarder from Roof Deck

A cloth industrial duct tape shall be adhered over all the seams of metal roof decking, at any penetration edges, and at all surface areas exhibiting sharp burrs or similar protrusions. For other types of roof decking, cloth industrial duct tape shall be adhered over all irregularities which could potentially puncture polyethylene membrane.

3.1.7 Vapor Retarder Installation

3.1.7.1 Integral Facing on Blanket Insulation

Integral facing on blanket insulation shall have the facing lapped and

sealed with a compatible tape to provide a vapor tight membrane.

3.1.8 Slip Sheet Installation

A slip sheet shall be laid over the blanket insulation facing to prevent the vinyl facing from adhering to the metal roofing.

3.1.9 Splash Block Installation

Splash blocks shall be located as shown.

3.2 FIELD PAINTING

Immediately upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with the same material used for the shop coat. Shop-primed ferrous surfaces exposed on the outside of the building and all shop-primed surfaces of doors and windows shall be painted with two coats of an approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with the manufacturer's recommended touch-up paint.

-- End of Section --